MINERAL & ENERGY ISSUE MARCH 2003

# Teacher's Guide

AG IN THE CLASSROOM–HELPING THE NEXT GENERATION UNDERSTAND THEIR CONNECTION TO AGRICULTURE

**Resources**

*Out of The Rock* books, videos, and music cds are a valuable source of information and activities for teachers on mining, geology, the environment and economics.
National Energy Foundation
Resources for Education
3676 California Ave, Suite Q117
Salt Lake City, Utah 8404
801-908-5800
*http://www.nef1.org/outoftherock/index.html*

*Mine Safety & Health Administration (MSHA)*
http://www.msha.gov/KIDS/KIDSHP.HTM
has lessons, maps, photos and games plus links to other mining information

*State of Colorado, Division of Minerals and Geology-Department of Natural Resources*
Find mining information about your county at: http://mining.state.co.us/. Children can play games and find links to related websites at http://mining.state.co.us/kids/dmgkids.htm.

*Mineral Information Institute*
501 Violet Street Golden, CO 80401
303/277-9190
www.mii.org has free teaching materials, homework help, mineral photos and maps.

*Women in Mining Education Foundation*
P.O. Box 260246, Lakewood, Colorado
80226-0246 303-298-1535
Fun classroom activities at
http://www.womeninmining.org/activity.htm

**Other Reading:**

*Geology Rocks!: 50 Hands-On Activities to Explore the Earth*
by Cindy Blobaum
published by Williamson Publishing 1999
An introduction to concepts for young geologists as well as a great place to find ideas for activities and experiments to aid him or her in exploration of the earth! The text is written in a witty manner, yet still provides a wealth of information.

Comments, questions, suggestions and feedback about the Colorado Reader are welcome.
Contact: Colorado Reader Publisher:
Colorado Foundation for Agriculture
Bette Blinde, Director, P.O. Box 10, Livermore, CO 80536
Phone (970) 881-2902, Fax: (970) 881-2587

**Pages 1&2**

**More about History...**Exploration for and the discovery of valuable minerals leads to the growth of civilization and settlement of frontier areas. During the 1500s through 1700s Spanish explorers crossed Colorado searching for the fabled Seven Cities of Gold. At that time, Native Americans were the only people living in Colorado. Later, in the early 1800s mountain men explored our mountains and fur-traders and trappers settled along trade routes and rivers. It wasn't until the discovery of gold in 1858 that Colorado really became populated to a large degree.

Mining stimulated the development of many other industries, one of which was agriculture. Everyone needs to eat, and fresh food was hard to come by in those days. One gold miner in the 1860s named David Wall seized on the opportunity and decided to raise vegetables. He succeeded in making $2000 per acre–an enviable amount even by today's standards.

Since 1859 Colorado's mines have produced about 45 million ounces of gold. With the price of gold at around $350/ounce today that gold would be worth $15.75 billion. In the Cripple Creek area alone, 22 million ounces of gold were extracted.

**FUN FACT**

Rhodochrosite (pronounced row-dough-crow-site) is the official Colorado state mineral. It is deep red or pink and is found in gold and silver veins. They are collected and used as mineral specimens, for sculpting and in jewelry.

**Mining History Activity:**

Select one of the many mining camps from Colorado history. Discuss the relationship between the mining operation and the growth of other businesses in that area. Did the mining camp become a ghost town or is it still a community today?

Create a map showing the mine and its effects on the region. Indicate roads, railroads, bridges, buildings, etc. An example of this would be Cripple Creek and it's relationship to Colorado Springs. Much of the money miners earned in Cripple Creek was used to build the beautiful Victorian houses (that can still be seen today) in Colorado Springs. In some Colorado mining towns, old brick buildings have been turned into gambling casinos.

Find out about the history of mining in your area. Are there any abandoned mines? Interview someone who has worked in the industry.

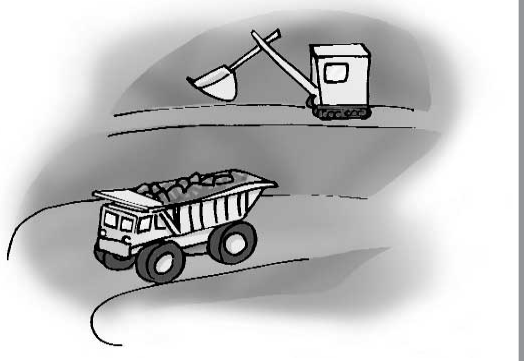
Gather photographs, maps, and information related to local mining. Put your research findings into a presentation. Place your completed project in the library or online.

If there are some active mines, milling or fabrication operations in

*(continued on page 2)*

Photocopy the questions below to practice analogies. Using the reader, students can use the picture on page 2 of the house and the story "What Is Mining and How Is It Done?" on page 4 to find answers.

# Mining Analogies



Analogies are comparisons. Complete each analogy below. Answers can be found in the picture of the house on page 2 and the story "What Is Mining and How Is It Done?" on page 4. An example has been done for you.

Example: Mining is to minerals as farming is to crops.

1. Surface mining is _____ the surface as underground mining is below the surface.
2. _____, granite and sandstone is to quarrying as gold and platinum are to placer mining.
3. _____ mining is to surface mining as gold panning is to placer mining.
4. Wallboards are to gypsum as electrical wiring is to _____.
5. Asphalt is to petroleum products as bricks are to _____.
6. Galvanized steel is to _____ as concrete is to limestone.

*(continued from page 1)*
your area, plan a field trip. Observe the geology, mining, reclamation, and recycling. If you live in or near Leadville check out the Mining Hall of Fame or visit them online at http://www.leadville.com/miningmuseum/. If you are in the Colorado Springs area visit the Western Museum of Mining and Industry.

**Answers to Mining Analogies (above):**
1. on or at
2. Marble or limestone
3. Strip (or open pit)
4. copper
5. clay
6. iron or zinc

**More about The Importance of Mining...**
**Hands-on Activity/Discussion:**

Make a one-day journal in which each student lists all the items he/she used that day that contain minerals. In addition, have students search around home, a hardware store, or a pharmacy for more items to include in their journal.

Talk about the things the students used before coming to school that involved minerals or mineral products? Things like: drinking from a glass, eating cereal from a bowl with a spoon, showering with soap, using deodorant, turning on a light, listening to a radio, using a computer, cleaning the cat box, riding a bicycle or schoolbus to school, or using coins.

**FUN FACT**

Aquamarine is the state gemstone. They are found and mined on the mountain peaks of Mount Antero at over 14,000 feet high. These aquamarines range in color from light blue to pale and deep green and are primarily used in jewelry.

Have the students draw a picture of your classroom and label everything made from minerals. Find out which minerals are mined in Colorado.

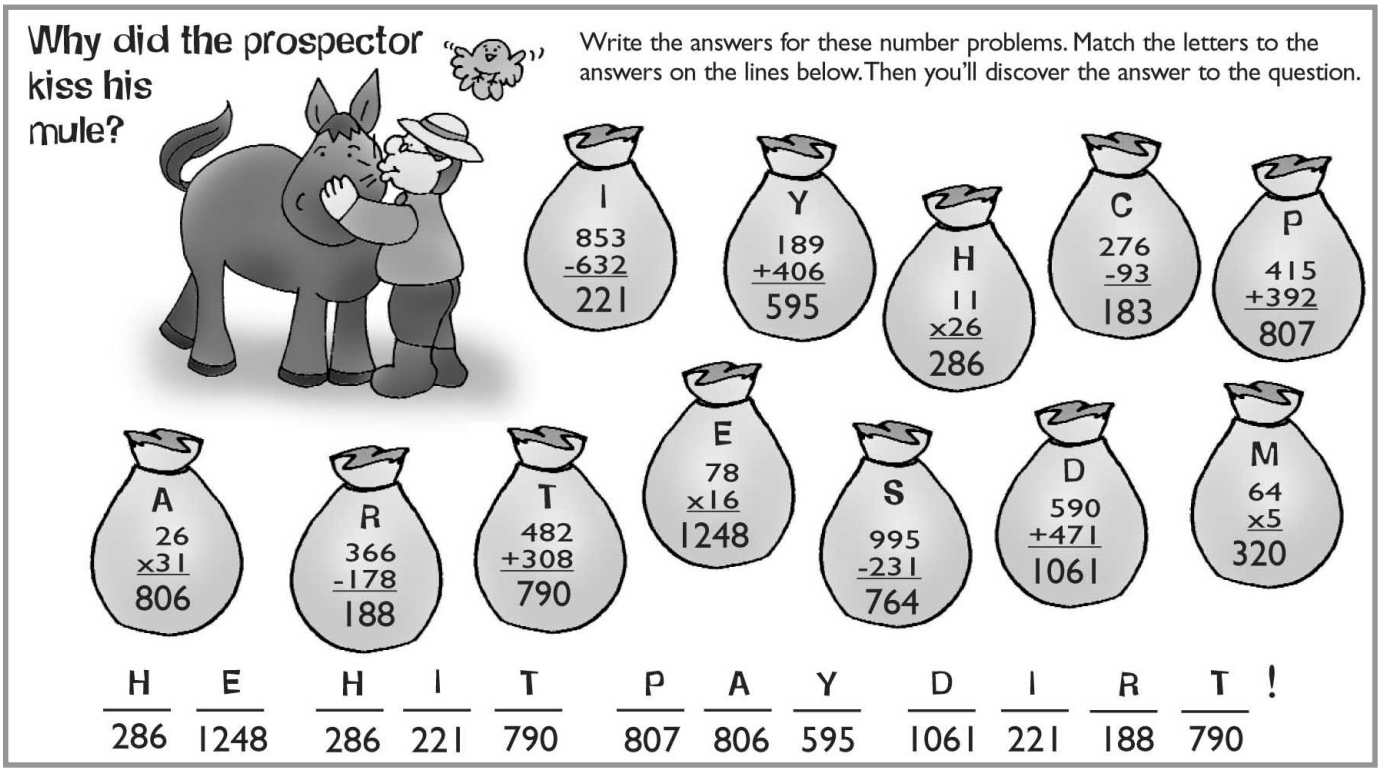
Discuss how our lives would be different if we didn't use minerals.

**Page 3**
**Answer for "Which things are not made with minerals?"**

This question was a little tricky. Everything in the picture was made from minerals, so the answer is none.

**Page4**

**Answer to Prospector's Kiss Math Game:**




**Page 5**

**Hands-on Activity:**

**Make Crystal Rock Candy**

Materials:

6 cups of sugar
1 1/2 cups of water
string
pencils
3 heat-proof jars or glasses that will not break when hot water is added (pint size canning jars work well)
saucepans
spoons
measuring cups
food coloring or flavorings
a stove
scissors
drawing paper and pens or pencils

1. Pour water into a saucepan and bring it to a boil.
2. Remove the water from the heat and add three cups of sugar. Stir until the sugar is dissolved.
3. Slowly add three more cups of sugar stirring until all the sugar is dissolved. Reheat the water if necessary.
4. Pour mixture into the jars or glasses.
5. Add a few drops of food coloring and/or 1/2 teaspoon of flavoring to each jar if desired.
6. Tie a piece of string to the pencil. Lay the pencil across the top of the jar so that the string hangs down into the solution. The strings should be long enough so that they stop just above the bottom of the glass.
8. In a few hours examine the string in the glass. Crystals will begin to form in one hour, and continue to solidify for several days.
9. If a layer forms on the surface of the jar, break it. When the liquid completely evaporates, the candy is ready.
10. Look at the crystals and draw a picture of them.
11. Taste one. If you like it, you can eat it.

**More about...**

**STAY OUT–-STAY ALIVE!** is a national public awareness campaign aimed at warning children and adults about the dangers of exploring and playing on active and abandoned mine sites. Every year, dozens of people are injured or killed in recreational accidents on mine property. Each April, around Earth Day, "Stay Out–Stay Alive" partners visit schools, communities and youth organizations throughout the country to educate children about the importance of steering clear of active and abandoned mines. To become involved in "Stay Out–Stay Alive," and to download posters and stickers please visit : http://www.msha.gov/places/placeshp.htm.

*(continued on page 4)*

*(continued from page 3).*

**Hands-on Activity/Discussion:**
Discuss the various ways you can get hurt on an active or abandoned mining site. Have the children create their own brochures, stickers or posters that address the various hazards with the STAY OUT - STAY ALIVE message.

**Page 6**
**Answers to Materials Mined in Colorado Questions:**
1. Larimer
2. Natural gas and oil
3. Lake county
4. San Miguel
5. Gold, gemstones, peat, granite, quartz and silver
6. Boulder county
7. Gypsum, sandstone, coal, silica, dolomite, limestone, oil, clay, mica, granite, stone and quartz

**Activity:**
Find your county or region on the Colorado Mining map. Identify the different types of mining and/or extraction (in the case of oil and gas) that are taking place in your area. Don't forget the mining of rock and aggregates such as sand, gravel, and stone. They are important commodities that provide the basic infrastructure materials for Colorado's booming economy of the late 1990s and 2000s. Production of these commodities has increased steadily over the past decade.

Select a mineral and learn about how it is mined. Compare the mining techniques of your mineral with other minerals.

The overall value of mineral production in Colorado was almost $800 million in the year 2000. Coal led all mineral sectors (with the exception of oil and gas) in revenues. The total value of oil and gas produced in Colorado during 2000 was $2,830 million. Coal continues to meet nearly 85% of Colorado's electricity needs.

**Hands-on Activity:**
**What's in the Cereal You Eat?**
Materials:
1 cup iron fortified cold cereal (Total)
2 cups hot water
1 clear drinking glass

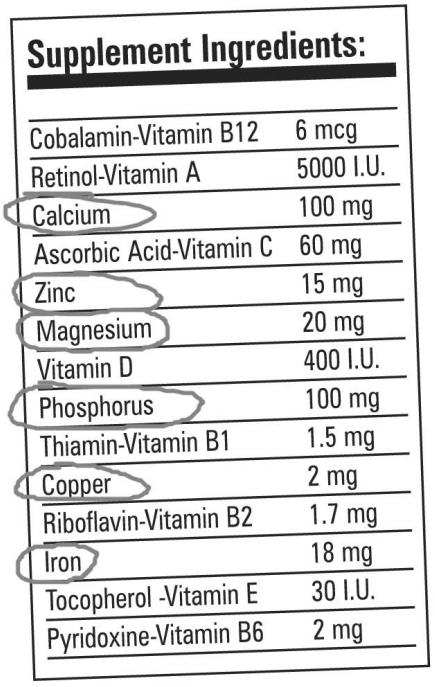
White magnet stirring bar or popsicle stick with magnet painted with white epoxy paint.

1. Put cereal in the glass.
2. Add hot water to make a slurry and stir with the stirring bar until the cereal is soggy. The longer the cereal is stirred the more complete the iron removal. Usually 30 minutes gives the maximum iron recovery.
3. After 10 to 20 minutes, remove the magnetic stir bar and note the dark slivers of iron on the ends. These are particles of metallic iron.

*Conclusion*:
Why does this work? Cold cereals are fortified with vitamins and minerals for health. Metallic iron is added to fortified cereal and this form of iron is magnetic. In this experiment the magnet collects the iron.

Find this and many more classroom activities at the Women in Mining Education Foundation website: http://www.womeninmining.org/activity.htm

**Page 7**
**Answers to Supplement Ingredient Game:**




**Page 8**
**Answer to Animal /Reclamation question:**
fish, frog, snail, mouse, deer, duck and rabbit

**More on Protecting the Environment:**
The trend in product design is to use lighter weight materials, substitute plastics for metals, and recycling, all of which reduce the amount of raw materials required. To date, there are no good substitutes for many critical materials such as gold which because it is malleable, highly conductive, and does not react with other common materials is used in medical devices, computers and other electronic circuitry.